INTEGRITY BIOFUELS

Biodiesel History & Production

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Introduction Of The Diesel

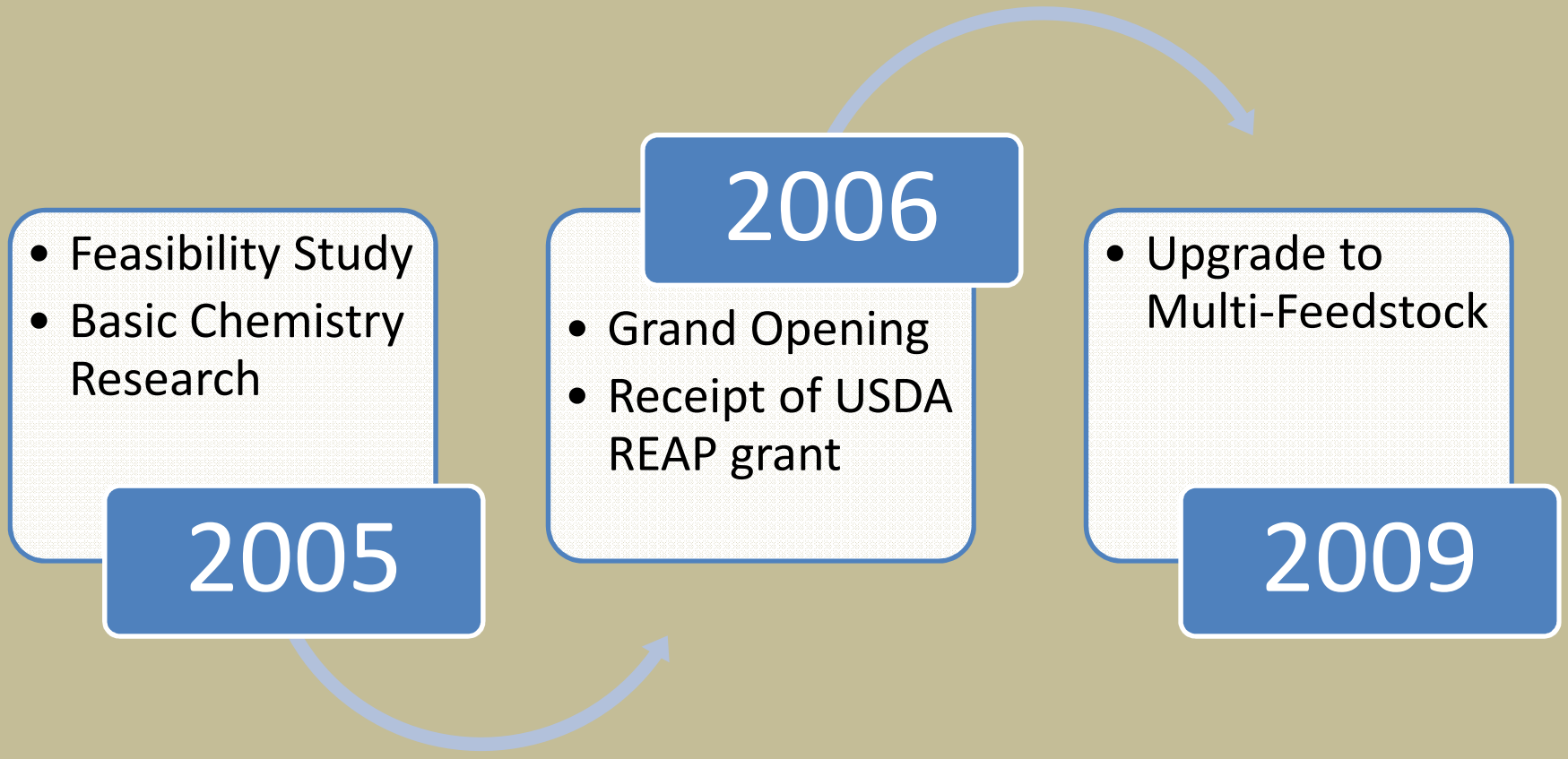
• Rudolf Diesel's prime model, a single 10 ft (3 m) iron cylinder with a flywheel at its base, ran on its own power for the first time in Augsburg, Germany, on August 10, 1893.

• Rudolf Diesel demonstrated a Diesel engine running on peanut oil (at the request of the French government) built by the French Otto Company at the World Fair in Paris, France in 1900, where it received the *Grand Prix* (highest prize).[14]

Modern History of Biodiesel

- In 2005 the commercial biodiesel production in U.S. started to gain traction
- In August 2006 Integrity Biofuels began production
- By the year 2009 the combined production of all U.S. biodiesel plants was approximately 599 million gallons.
- So far in 2013 the U.S. production level of 1.16 Billion gallons, with a monthly production rate reaching 170 Million. This means if the industry ran at our top production rate for an entire year we could produce right at 2 Billion gallons. Which is slightly over 5% of the total U.S. Diesel consumption.

History Of Integrity Biofuels



= **Continuous Improvement of Chemistry and Management Practices**

Biodiesel Production-Chemistry

Continuous Flow Transesterification Line

The Chemistry needed for production of high quality biodiesel differs for each feedstock.

Acid Esterification- Waste Oil, Animal Fat, Crude Soybean oil

Transesterification- RBD Soybean oil, Refined Canola oil

Process Control

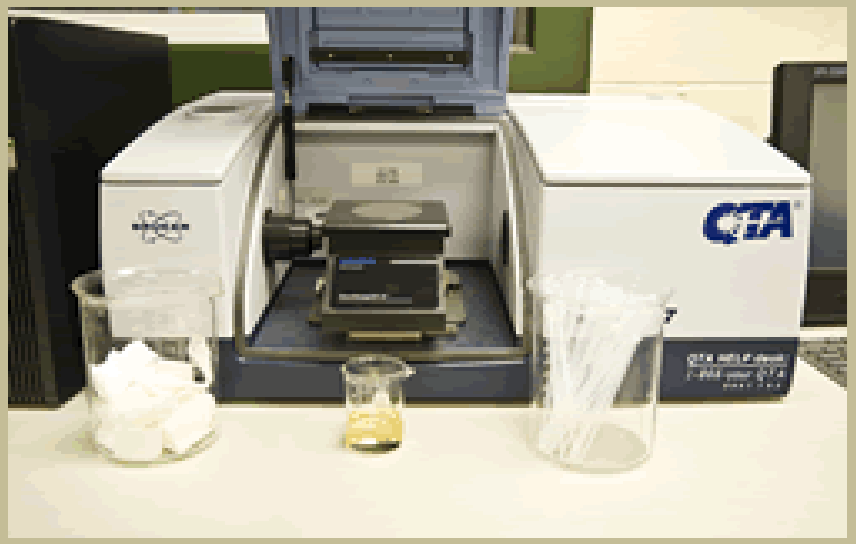
Key Chemistry Considerations

- Carbon Chain Distribution of the different Feedstocks will affect several final product traits such as cloud point, oxidative stability, and cetane #
- Moisture, Free Fatty Acid, and Unsaponifiable Matter content in feedstocks must be addressed in processing.

Quality Control Issues

Methanol Distillation Tower

ASTM D6751
Total Glycerin-0.24% Max
Free Glycerin-0.02% Max
Water & Sediment-0.05% Max
Acid Number-0.5 mg KOH/g
Methanol-0.2% Max



QTA Trait Analyzer
BQ9000 for 4 key specifications

ASTM Standard For Fuel Quality

- **D6751-** Now contains two specifications for B-100 forming a #1/#2 system much like petroleum diesel.
- Our typical COA contains 24 individual tests that each tell the customer something different about the fuel quality.

BQ-9000: National Biodiesel Board Quality Assurance Program

Performance

Average Density and Heating Value of Biodiesel and Diesel Fuel			
Fuel	**Density, g/cm3**	**Net Heating Value Avg., Btu/gal**	**% Difference vs. No.2 Diesel Avg.**
No. 2 Diesel	0.85	129,500	
Biodiesel (B100)	0.88	118,296	8.65
B20 Blend (B20)	0.856	127,259	1.73
B 2 Blend (B2)	0.851	129,276	0.17

http://www.biodiesel.org/pdf_files/fuelfactsheets/BTU_Content_Final_Oct2005.pdf

Food VS Fuel

Feed stocks used at Integrity Biofuels

- RBD Soybean Oil- Co-product of Soybean meal production
- Waste Cooking Oil- By product of Food Production
- Animal Renderings- By product of Food Production

Other Uses for our feed stocks

- Soy oil- salad dressing, cooking oil, mayonnaise, and some sauces. None of these are nutritional staples
- Waste Cooking Oil- Landfill/some industrial use

http://www.soyconnection.com/soybean_oil/pdf/foodvsfuel_soy_biofuels.pdf

Questions/Comments